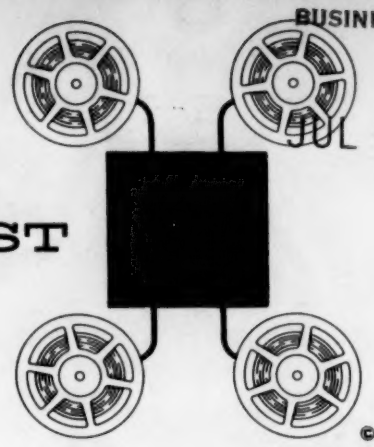
DATA PROCESSING DIGEST

1140 South Robertson Blvd., Los Angeles 35, California

a publication of Canning, Sisson and Associates, Inc.



VOLUME 5 NUMBER 7

JULY, 1959

Programing

THE AIR FORCE BREAKS THROUGH COMMUNICATIONS BARRIER

Col. E. R. Miller and Jack L. Jones
UNIVAC REVIEW, Winter 1959; pages 8-12

((The Air Materiel Command of the U. S. Air Force has developed an automatic programing system called AIMACO. AIMACO is an extension of the Remington Rand Flow-Matic system, wherein programers write their programs in English-language sentences which can be read and understood by management personnel. These same sentences are then read into a computer and "compiled" to give the actual machine programs. At present, the AIMACO compiling system can convert the English language sentences into RemRand 1105 coding and the system will soon be extended to convert the same sentences to the IBM 705; with some slight modifications, it can also compile for the Univac I and Univac II machines. The complete system will be in productive operation this summer.))

Using Flow-Matic as a starting point, the AIMACO system has been designed to:

1. Improve communications among all offices.
2. Provide AMC with an effective control of all systems in the development and process stages.
3. Reduce time schedules
4. Reduce problem of system modification.
5. Make possible direct comparison of different data processing systems.

"During the development phase, the computer programming group produces charts that are in a format for a specific computer with its own symbolic notations that are readily intelligible only to the skilled programmer. This is the blueprint our operating managers should re-

CONTENTS

English code for all AF computers

view and evaluate but is normally unintelligible to them on account of the complexity of the machine language.... As each equipment has its own specific code, relating to its internal functions being performed by it, but not necessarily related to the processing data function, the coding group may be diverted from the proper logic of the data processing system. This usually calls for a realignment and reprogramming to incorporate the design changes that meet management requirement.

"...Our EDP program is largely a function of the effectiveness of the computer programming group who exercises a control that was never intended for them and actually they are reluctant to carry such a responsibility by themselves."

Outstanding features of AIMACO are:

1. Complete separation of data designs and pseudo-code.

2. The concept of generators as a technique for compiling an efficient running program.

3. Design of an input-output package consisting of three banks of core memory, a double magnetic drum, and 20 Uniservo magnetic tape units with buffers.

AIMACO may be separated into three levels:

1. The group of routines to be operated on Univac I using AIMACO pseudo-code and file designs as input to produce USE compiler language and using input/output parameters as output.

2. Input received directly from the first level is the input/output sort-merge generator.

3. The USE compiler assembles the final running program.

SIGNAL CORPS RESEARCH AND DEVELOPMENT ON AUTOMATIC PROGRAMMING OF DIGITAL COMPUTERS

Capt. W. F. Luebbert and Capt. P. W. Collom Jr., U.S. Army
COMMUNICATIONS OF A.C.M., February 1959; pages 22-27.

The Signal Corps has set up two groups in the computer programing effort; one to provide arithmetic, tape supervision, housekeeping, program diagnostic, and format control subroutines, along with a simple one-to-one symbolic assembly routine. The other group will aim at a major advance in programing technique.

It will develop techniques to further the Automatic Programing Language (APL), preparing a "compiler to write compilers," and provide guidance to the first group in the writing of a limited compiling routine.

From "technical jargon" to a universal computer language

The APL language will consist of many subsets ("technical jargons"). The Automatic Programing System will provide an automatic method of translating from any "technical jargon" to some "universal" language in which all problems can be expressed and which any computer can understand when presented with the limited compiler routine. The input will not necessarily be understandable to humans (in the sense that the FLOW-MATIC is), since the primary source of programs at this stage of translation will be the Automatic Programing System itself.

The APL must be capable of orderly growth and development as conditions and requirements change. Rather, the design group will establish formats, guide lines, and procedures so that at any time a special group can be assembled to write special programs in a "technical jargon" with which the group is familiar. They will be assisted by a consultant familiar with APL. They will write the special vocabulary which is suited to the needs of their special field, then they will produce a compiler which will translate programs written in their "technical jargon" to the "universal" language.

The aim is to provide "a fast, cheap and efficient means of producing specialized compilers to handle special, easy-to-learn technical vocabularies with a strong common language basis. These compilers will translate programs written in the language used into an object program for any computer desired."

COMPATIBILITY IN DATA PROCESSING

NAVY MANAGEMENT REVIEW, May 1959; pages 16, 17.

Compatibility among machines in large systems, such as the Navy's, is a good thing, but "if compatible equipment will not do the work of the installing activity as well as non-compatible equipment, compatibility is purchased at too high a price....It is more appropriate and conducive to progress that earlier installations, however sound the selections when made, act to become compatible with latest best selections than vice versa."

To "attempt to achieve language integration with the present generation of data processing equipment--by procuring the same make and model equipment throughout the Navy....would inevitably lead to stagnation. Until we have languages, systems, and equipment much more closely fitted to Navy needs, enough flexibility must be retained to stimulate progress toward those improvements which are undoubtedly possible and which are greatly needed."

General Information

SOME MANAGEMENT ASPECTS OF ELECTRONIC DATA PROCESSING

LCDR A. B. Meihls, USN
NEWSLETTER, Navy Supply Corps; January 1959; pages 18, 19.

Some old concepts on planning for EDP systems are listed, along with the newer approach:

1. The committee approach to planning has given way to the assignment of responsibility with one highly placed person who may be assisted by a committee, but who has the ultimate responsibility.

2. The idea that computer systems people must have mathematical backgrounds has been replaced by the practice of training systems people in computer use.

3. The necessity for random access in inventory management has been tempered because of the lack of adequate equipment. Other ways of getting fast information on stock levels can be developed with present equipment.

4. The use of the single function for justifying purchase of a computer is no longer the intelligent approach. Rather, a completely integrated application planned in all its major aspects before installation is desirable. The savings of the integrated system will justify the computer whereas the single application will not.

IDEAS FOR MANAGEMENT

Systems and Procedures Association.

The Eleventh Annual International Systems Meeting papers are published in this volume. As in the past a section of the proceedings is devoted to electronic data processing. Probably the most unusual of these papers are two given by the consultants who set up the Quelle order processing system in Nurnberg, Germany ((see DPD, June 1958, page 12; "Electronic Order-Filling in Germany's Biggest Mail Business")). The two papers describe the actual physical arrangement of the automatic warehouse and order-filling system of the large German mail order house, and the system concept upon which it was based. The system concept is that all input and output stations should be located at the data origination and data use points, and should be connected by cable, or

New ideas in management information systems

other means with the central data processing center. This keeps the central processing location free of a clutter of tapes, cards and other input media, and saves time in transporting raw data to the center for processing. Furthermore, it keeps significant original and end-use date in the places which are most immediately concerned with them.

The fuzzy borderline between systems design and operations research is demonstrated in a description of United Air Lines' overall systems plan. OR is further emphasized in an introductory paper on the subject, followed by a case study of the Chicago Area Transportation Study and its special computing system designed by Armour Research Foundation.

The final paper in the EDP group--second section of "Basics of Electronic Systems"--has some fresh ideas in electronic systems design, among them the suggestion that business systems consist of people, a goal, and files, and relationships between them. Another, in answer to a question about which department should start and then control the EDP system: give a small input-output-interrogation device to each of the principal management "helpers": sales, procurement, production, engineering, controller. Give each a small storage device, and make a hook-up so each one can query each other's memory device. Each "helper" updates his own file (memory). Each "helper" then is interested in the total integrated system, but there is no heirarchy of information handlers to impose restrictions or cause bottlenecks, or promote politics.

INNOVATIONS AND APPLICATIONS

Andrew Booth, Birkbeck College, London
AUTOMATIC DATA PROCESSING, April 1959; pages 5-9.

The author sees future applications of computers including large scale information storage and retrieval, machine translation, direct connection with executive desks for continuous access of information, and processing or querying on a priority basis (for example, engineering design changes taking precedence over routine clerical work during a computing period).

Another function being developed, with great future possibilities, is the direct input of drawings and photographs into the computing system. This could lead to applications such as patent searching and automatic control of machine tools. A more nebulous area of computer use is its application to scientific and philosophical thought. The picture here is one of the computer mulling over its own choice of ideas during idle time, much as the human mind does. Finally, there is the possibility of full-scale operation on problems of government with the joyful prospect of the elimination of politicians.

CHANGE IN MANAGERIAL MANPOWER WITH MECHANIZATION OF DATA-PROCESSING

C. Edward Weber, University of Pittsburgh
JOURNAL OF BUSINESS, April 1959; pages 151-163.

Two business firms were studied to determine the changes in manpower which accompanied the mechanization of data-processing. The two companies were a manufacturing company with job-shop operations, and a basic steel company.

It was found that clerical and semitechnical employment in the two firms decreased, while managerial employment increased both numerically and proportionally. The increase appeared to be associated with the efforts to change over to the new methods, in solving problems relating to the introduction of electronic data-processing and to the analysis of costs. A possible implication is that "a concomitant of economic growth may be a relative shift of human resources into managerial activity."

COST ACCOUNTING AND AUTOMATION

A. Kenyon, Guest Keen and Nettlefolds, England
AUTOMATION PROGRESS, April 1959; pages 134-137.

Future automation of plants will change the concepts of cost accounting. "The fact that so much will be predetermined is likely to cause a change in emphasis in budgetary control, which concentrates on reporting deviations from plan, or exceptions, to management. These will tend to be smaller and fewer, as human control is replaced by automation.

Less attention to cost deviations, more time for forecasting

"Rates of output will be less likely to be subject to casual variation. These will be planned, and depend entirely on machine performance.

"The operator will tend to exercise a more remote and general control, and inspection will become an automatic process. Personnel establishments will be fixed, jobs will be more closely defined and payment by results will largely disappear.

"Spoiled work will be cut down to a minimum with automatic processing, handling and sizing.

"The costs of power, gas and oils will vary closely with the running time of the line and, therefore, with output. Furthermore, preventive maintenance on a highly organized basis will aim to eliminate all breakdowns in the production process."

Customer demand will be the important factor in planning, with variations in demand causing serious consequences when plant usage falls below the planned level. The number of deviations from standard cost will be reduced, allowing the cost accountant to devote more time to investigations, interpretations of results, and forecasting.

Meticulous planning and careful assessment of the economics should be undertaken before a large automation project is approved. Once a project has been completed and set going, its momentum will be such that it will be difficult to stop without heavy loss and interruption.

"The cost accountants' greatest contribution will be in helping management choose the most advantageous course of action by presenting it with facts about the cost of automation before it is installed."

EDP WILL BE A COMPETITIVE NECESSITY

STORES, May 1959, page 20.

Retailing is lagging behind industry in using electronic equipment because of the high cost of equipment, the apparent unwillingness or inability of retailers to prepare for EDP by installing uniform procedures, and by installing some systems without a clear idea of how the equipment was to be used. These are the opinions of Mr. Frank J. Buescher, controller of D. H. Holmes, Ltd.

He believes that retailers will face two major problems in the next ten years: to improve their operations by electronic or other methods, and to adjust to the changes in management organization that will result. He believes "the place of today's middle management executive will be filled tomorrow by the technologist." For example, scientific methods have been used to determine which dresses in a department should be reordered after one week on the floor. The company found the method resulted in a 17 per cent decrease in dress markdowns from the previous year.

Stores are advised to appoint some one ("not necessarily from the controller's department") to keep up to date on equipment, and to review procedures and prepare for their greater systematization.

A COMPARATIVE REPORT ON DATA PROCESSING EQUIPMENT IN MEMBER STORES OF THE NATIONAL RETAIL MERCHANTS ASSOCIATION

The Electronics Committee of the Retail Research Institute (NRMA) has conducted two surveys of six hundred stores each with a volume in excess of one million dollars annually. The survey covers the use or contemplated use of electronic or electro-mechanical

equipment in 1956 (first survey) and 1958. This includes electronic and punched card computers and paper tape or perforated price ticket equipment. This report gives summary tables of replies from the 1958 survey, as well as specific comments made by the respondents to some questions. The information will be used by the Electronics Committee to aid in research for the retail industry in the areas of applicability of electronic data processing systems. The scope of this research is similar to that undertaken by the banking industry. The report may be purchased for $3.50 from The Retail Research Institute, NRMA, 100 West 31st Street, New York 1, New York.

AUTOMATION IN RETAILING

JOURNAL OF RETAILING, Spring 1959 (entire issue)

The entire issue is devoted to various aspects of automation in retailing. The first article suggests some of the problems and opportunities in electronic data processing systems in the retail field. This is followed by articles on automated merchandising devices in the display and check-out areas, including an interesting description of the department store in 1965; the NCR "Sales-Tronic" system, including the NCR 304; a review of retail electronics in Europe; the new concepts of materials handling in retail warehousing; the need for automation in fashion merchandising and inventory control; automatic equipment in textile testing; and the unique problems of the retail industry in controlling both the flow of merchandise and the flow of customers. This special issue seems to be indicative of the gaining momentum of interest among retailers in automation in their own industry.

HOW CHAINS ARE MOVING INTO AUTOMATION

CHAIN STORE AGE, April 1959; pages 25-29

Among chain stores and their suppliers which are advancing into electronics are the following examples:

The Committee on Electronic Equipment of the National Association of Shoe Chain Stores has been testing point-of-sale data input devices.

General Shoe Corporation is putting punched cards into Flagg Bros. chain shoe boxes for automatic merchandise control and reordering. The cards are by-products of the computer's production control operation.

Edison Bros. stores use print-punch tags and tickets in hosiery and handbags for stock control and reordering.

Grayson-Robinson and Hartfield chains both use IBM 650's for fast reporting on apparel. In addition, Hartfield processes warehouse payroll and credit transactions on the 650.

A chain which made a study of "outs" in its inventory found that after it discounted its estimate by 50% it could still afford to spend $100,000 a year to prevent "outs" by installing an electronic system and still come out ahead.

ELECTRONICS FOR EVERYBODY?

CHAIN STORE AGE, April 1959; page 56

Retailers are beginning to see "the wisdom of analyzing operating results by individual items rather than by categories or departments.... you've got to know the 'velocity' of an item's movement, as well as the gross margin it returns, before you can measure its contribution." For this kind of "precision merchandising," electronics "can supply the essential facts without which no[merchandising]judgment can be worth much."

ELECTRONIC ACCOUNTING PLAN FOR THE SMALL BANK

Dale M. Bradley, Peoples Community Bank, Three Rivers, Michigan
BURROUGHS CLEARING HOUSE, April 1959; pages 42, 43, 97, 98

The Peoples Community Bank is a new one, open just about six months. It began immediately with electronic bookkeeping and account numbering. The decision to begin in this fashion was made on the basis of speed of operation, the desire to establish a system that would not quickly become obsolete, and a concern with costs. It is unusual to see a description of an electronic system which "got in on the ground floor," and this article is interesting from that standpoint.

A PICTURE OF FUTURE BANKING

The Executive Director of The National Association of Bank Auditors and Comptrollers suggests that banking in the future may have these characteristics: The establishment of central data processing centers to service small and medium size banks in their areas and to perform large-scale banking services; one of these services might be the posting of employees' wages or salaries directly from the employer's account to the employee's account, regardless of the banks involved. This process would be dependent upon the universality of banking systems.

((From a news release))

COMPUTERS IN BEHAVIORAL SCIENCE

BEHAVIORAL SCIENCE, April 1959; page 162

A new section is announced--that of computer program abstracts for exchange and information among social scientists. Also, information about computer installations and systems designed for behavioral scientists, and general topics of interest to this field will be included.

This issue includes a short paper by Steven G. Vandenberg, University of Michigan, titled "Some Thoughts About Possible Changes in Research Practices Resulting from the Use of Electronic Computers." "Because the writing of a new program is a rather time-consuming task, it becomes even more important than before the advent of electronic computers to consider carefully what kind of an analysis is desired. When good fortune provides a program which appears to be suitable, there is the grave danger that the new user of the program does not know precisely what the program does and therefore may put it to an inappropriate use.... To be on the safe side it will be advisable to continue to perform some trial computations on paper even though a program is available which seems to fit properly. It certainly becomes imperative that program descriptions contain information necessary to evaluate its appropriateness."

Sharing programs in psychological studies

Another danger in using a pre-written program is the likelihood that "the availability of a computer program for a particular method will lead to the predominant use of this method even if another ["best"] method might be known to the investigator. To counteract this tendency a vigorous drive will be necessary to program more than one method and to compare systematically the results obtained via different methods.

"A related change we may look forward to is the occurrence of more systematic examination of things frequently taken for granted [previously], such as linearity of regression or normality of distribution. Because the investigator no longer has an opportunity to 'see' the computations, a great deal more reliance will have to be placed on the incorporation of statistical indices for these characteristics, evidence which will tell the investigator when his data does not fit the assumptions of the statistical model.... It may at times be possible to have the program automatically switch to another computational scheme which fits the particular type of data better."

In the publishing of reports, "as the quantity of data increases it may be reasonable to expect that instead of including large amounts of tabular material many authors will prefer to specify that such and such statistical analyses were performed using such and such a program and that only the following results were found to be statistically significant."

Systems Design

SYSTEMS AND PROCEDURES—A HANDBOOK FOR BUSINESS & INDUSTRY

Edited by Victor Lazarro
Published by Prentice-Hall, Inc., 1959. $10.00

Sixteen authors have joined in compiling this handbook for systems and procedures people, each author writing one of the sixteen chapters. These begin with a description and explanation of the systems function and its place in management. It is followed by chapters on the organization and administration of the systems department, conducting a systems study, and charting.

Standard systems and procedures methods

The sixth chapter probes the meaning and function of management, and appears to be aimed at management consultants rather than the staff systems man. Included are detailed explanations of the evaluation methods, planning, and presenting the findings. This chapter is followed by a series of chapters on the specific activities of the systems staff: work simplification, work measurement, forms design and control, records management, company manuals. Chapter 11 explains the budget and cost control aspects of a business. Chapters 12 and 13, respectively, are devoted to tabulating equipment and electronic data processing systems, followed by a chapter on work sampling in the office. Chapter 15 is a resume of operations research techniques for management, and the final chapter is a guide for the selection and training of systems men.

The book appears to have included every aspect of the systems function, along with supporting material to give the prospective systems man a frame of reference for his chosen profession. Not that this book would be limited to the neophyte, although it will certainly be a welcome addition to the classroom. But even the established professional could find this book a refresher course in his chosen field. The chapter on business electronics, even though confined to less than forty pages, gives the systems man a fair view of the opportunities and scope of electronics, particularly as it involves the systems function.

Equipment

IBM SPECIAL INDEX ANALYZER

In cooperation with Documentation Incorporated, IBM has developed for the du Pont Company the Special Index Analyzer to provide a fast, accurate and automatic reference to cataloged data. Through the automatic comparison of numerically coded data punched in IBM cards, the index analyzer gives ready reference to all filed material relating to a particular subject. The system is adaptable to information retrieval situations such as technical libraries, personnel placement, and equipment design.

The system consists of an IBM printing card punch for reading and punching cards, and a logical and intermediate storage unit containing control equipment and an eight-channel paper tape punch and reader. An IBM electric typewriter may be added to the system to produce automatically typed responses to inquiries.

ELECTRONIC COMPUTER X1

THE OFFICE MACHINE GUIDE, February 1959; pages 1-4

The X1 is manufactured by N. V. Electrologica, of the Netherlands. It is a fixed point binary machine in one-address code, with a magnetic ferrite core memory. Maximum memory capacity (added units) is 32,768 words of 27 bits. Input at present is by punched tape and punched cards. Output is by both of these media or by electric typewriter or tabulating machine. A magnetic tape device is being developed.

A MAJOR DATA PROCESSING BREAKTHROUGH FOR BANKS

DATA PROCESSOR, March 1959; pages 1-3

The IBM paper handling and character sensing equipment for banks has three units, to be used for processing checks, deposit slips, ledger control slips and similar documents. The Proof Inscriber lists, distributes, proves, and endorses intermixed paper and card items. The sorter-reader sorts intermixed sizes at rates up to 900 items per minute, and reads the ABA standard code on checks for input to standard data processing machines. The Utility Inscriber is a modified IBM typewriter for printing numerals and four special characters on documents in magnetic ink.

DROPOUT ERRORS IN MAGNETIC RECORDING SYSTEMS

Robert A. Von Behren, Minnesota Mining and Mfg. Co.
AUTOMATIC CONTROL, April 1959; pages 16-21

Improved methods of coating have virtually eliminated coated-in defects on magnetic tape, but other causes of drop-out are being studied. These include small bits of foreign matter on the surface which separate the tape from the head, and dents or creases in the backing. From the analyses of dropouts conducted by MMM, some of which are described in this article, "it would appear...that future systems will require even closer attention to cleanliness and careful handling of the tape if reliable operation is to be achieved. The tape contact situation is so critical for short wavelength signals, it would seem that special techniques to provide more positive contact between the head and tape, such as the vacuum guide system of the Ampex video recorder, will be mandatory in future systems.

"Because contamination and tape distortion is also critical, better storage and handling of tape is also indicated. The use of sealed tape cartridges might provide a very good answer for the dropout problems of the future. However, if these problems can be solved, there is every reason to believe that the information storage capabilities of magnetic tape can easily be extended 10 or 100 fold."

The following article is a companion to the preceding one, and emphasises the effects of tape defects on the total system.

THE DEADLY DIGITAL DROPOUT

AUTOMATIC CONTROL, April 1959; page 18

Computer system characteristics as well as the "vagaries of continued high-speed mechanical operation," affect the incidence of dropout in magnetic tape processing.

Temporary dropouts are caused by momentary loss of head contact during the read or write modes. Permanent dropouts are caused by defects in the tape itself which prevent satisfactory pulses from being recorded on the tape, or lack of oxide resulting from poor coating practice. Magnetic inclusions cause permanent tape errors through the creation of noise pulses. Other permanent errors creep up on the unwary operator through the errosion of an inclusion below the original tape surface. Operational damage is another source of permanent dropout.

Tape users are admonished to carefully consider tape dropout specifications only in terms of the system on which the tape will be used. The National Bureau of Standards is presently working on methods of magnetic testing which will permit the evaluation of tape without reference to an individual recording machine.

References

The publishers of books and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in writing to them for more complete information.

Automatic Control
430 Park Ave.
New York 22, New York

Automatic Data Processing
Mercury House
109-119 Waterloo Rd.
London SE 1, England

Automation Progress
Stratford House
9 Eden Street
London NW 1, England

Behavioral Science
Mental Health Research Institute
University of Michigan
Ann Arbor, Michigan

Burroughs Clearing House
2nd and Burroughs Ave.
Detroit 32, Michigan

Chain Store Age, Administrative Ed.
2 Park Avenue
New York 16, New York

Communications of A. C. M.
5800 North Marvine Street
Philadelphia 41, Pennsylvania

Journal of Business
School of Business
University of Chicago
Chicago 37, Illinois

Journal of Retailing
New York University School
of Retailing
Washington Square
New York 3, New York

National Association of Accountants
505 Park Avenue
New York 22, New York

Navy Management Review
Supt. of Documents
U. S. Government Printing Office
Washington 25, D. C.

Newsletter, Navy Supply Corps
Bureau of Supplies and Accounts
(N1), Room 0211 Main Navy
Washington 25, D. C.

Office Machine Guide
International Office Machines Research, Inc.
Marnixstraat 419
Amsterdam, C, The Netherlands

Stores
100 West 31st Street
New York 1, New York

Systems and Procedures Assoc.
4463 Penobscot Building
Detroit 26, Michigan

Univac Review
Remington Rand Univac Division
315 Fourth Avenue
New York 10, New York

DATA PROCESSING DIGEST is published each month by Canning, Sisson and Associates, Inc., 1140 South Robertson Boulevard, Los Angeles 35, California. Subscription rate: $24.00 per year. Foreign postage (exclusive of Canada and Mexico): $2.50 additional. Single copies: $3.00 when available. Editor: Margaret Milligan

Comment

SOME COLLEGE COURSES IN EDP

The college courses for 1959-60 listed below are those which have come to our attention during the past year. There are undoubtedly many more excellent courses in EDP and related subjects in colleges and universities, and we hope our readers will tell us about them. We regret that space limitations prevent detailed descriptions of the courses. For further information, write to the source given for each institution.

ARIZONA STATE UNIVERSITY

Courses: Accounting 444; Machine Accounting Procedures
Gen. Bus. Admin. 301, 302; Mechanized Data Processing
Gen. Bus. Admin. 401g; Business Systems Analysis
Gen. Bus. Admin. 402g; Data Processor Programming

Undergraduate Courses: 444, 301, 302, 401g, 402g

Graduate Courses: 401g, 402g

Course Dates: School year 1959-60

Information: Dr. Ralph C. Hook, Jr., Bureau of Business Services, College of Business Administration, Arizona State University, Tempe, Arizona

CASE INSTITUTE OF TECHNOLOGY

Courses:
1. Undergraduate Curriculum in Management Science
2. Graduate Curriculum in Operations Research, leading to MS and Ph. D.
3. Special Program in Operations Research (Fall Semester), Graduate
4. Short Courses, Operations Research (2nd Semester)

Course Dates: School year 1959-60

Information: Dr. E. Leonard Arnoff, Case Institute of Technology, 10900 Euclid Avenue, Cleveland 6, Ohio

CORNELL UNIVERSITY

Courses:
Engineering: 4810. Intro. to Electronic Computers
3281. Computing Equipment and Industrial Application
Business: 234. Administrative Applications of High-Speed Computers
Mathematics: 661, 2, 3, Numerical Analysis

Undergraduate and Graduate

Course Dates: School year 1959-60

Information: Professor Richard W. Conway, Department of Industrial and Engineering Administration, Cornell University, Ithaca, New York

FORDHAM UNIVERSITY

Courses: C-58. Introduction to Electronic Data Processing (1st Semester)
C-59.650 Programming (2nd Semester)

Extension Courses

Course Dates: School year 1959-60

Information: Mr. W. C. Kernan, Director, School of General Studies, Adult Education Center, Fordham University, Bronx 58, New York

ILLINOIS INSTITUTE OF TECHNOLOGY

Courses: Business and Economics 426. Automatic Computers for Business Systems
Industrial Engineering 455. Introduction to Operations Research
Mathematics 457. Introduction to Digital Computing

Undergraduate Courses, may be used as electives in B.S. degree programs

Course Dates: School year 1959-60, 1st and 2nd Semesters

Information: Dean of Evening Division
Illinois Institute of Technology, Chicago 16, Illinois

LEHIGH UNIVERSITY

Courses: Math 305. Computer Programming
Ind. Eng. 350. Industrial Engineering Problems (2nd Semester only)
Ind. Eng. 407. Operations Analysis and Control
Ind. Eng. 408. Data Processing

Undergraduate and Graduate Courses

Course Dates: School year 1959-60

Information: Head of Industrial Engineering Department,
Lehigh University, Bethlehem, Pennsylvania

LOS ANGELES STATE COLLEGE

Courses: Bus. 494. Electronic Systems and Equipment (Fall)
Bus. 495. Electronic Programming (Spring)

Undergraduate Courses leading to BS in Business Administration

Extension Courses may be established on request by 20 or more persons.

Course Dates: School year 1959-60

Information: Alfred Ehrhardt, Assistant Dean of Instruction,
Los Angeles State College, 5151 State College Drive,
Los Angeles 32, California

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Courses: M371 (Math) Operations Research
6.536 (E.E.) Systems Engineering and Operations Research
6.251 (E.E.) Principles of Machine Computation
15.71, 15.712 (I.Mgt.) Production Management
15.591, 15.592 (I. Mgt.) Advanced Treatment of Techniques in Scientific Management

Undergraduate Courses: 15.71, 15.712

Graduate Courses: All

Course Dates: School year 1959-60

Information: Write for catalogue, Massachusetts Institute of Technology,
Cambridge 39, Mass.

NEW YORK UNIVERSITY

Courses:
470. Electronic and Tape-Processing Systems in Office Automation (Fall)
471. Office Automation for Small and Medium-Sized Companies (Fall)
472. Basic Programming for Medium-Size Computers in Business (IBM 650) (Fall)
473. Advanced Programming for Medium-Size Computers in Business (IBM 650) (Fall)
474. Programming for Random Access Accounting Machines (IBM 305 RAMAC) (Fall)

475. Programming for Fully Transistorized Intermediate-size Computers (IBM 7070) (Fall)
476. Introduction to Programming for Large-Scale Computers in Business (Fall)
425. Applications of Operations Research Techniques in Business and Industry (Fall)
425.5. Seminar in Modern Computing Techniques in Science and Engineering (Fall)
426. Automatic Programming Systems: Commercial and Scientific Applications - A Workshop Seminar (Fall)

Extension Course: Non-credit program for professional people
Course Dates: All courses meet one evening a week during the term.
Information: Dr. Denis Sinclair Philipps, Director, The Management Institute New York University, 1 Washington Square North, New York 3, N. Y.

OHIO STATE UNIVERSITY

Courses: Mathematics 692, 663, 694, 695, 698
Electronic Engineering 644, 666, 667, 714, 728, 738
Undergraduate Courses in College of Arts and Sciences leading toward BS in Mathematics
Graduate Courses leading toward an MS
Course Dates: School year 1959-60
Information: Entrance Board, Administration Building, Ohio State University, Columbus 10, Ohio

PASADENA CITY COLLEGE

Courses: 41. Coding for Digital Computers
Undergraduate Course
Course Date: Fall semester, 1959
Information: Mr. L. Clark Lay, Chairman, Mathematics & Astronomy Department, Pasadena City College, 1570 E. Colorado Street, Pasadena, Calif.

PENNSYLVANIA STATE UNIVERSITY

Courses: Commerce 58. Data systems and processing (Winter Quarter)
Engineering 430. Introduction to Digital Computer Programming (Winter Quarter)
Mathematics 453. Mathematics for Digital Computers (Winter Quarter)
Undergraduate Courses: Electives
Course Dates: School year 1959-60
Information: Warren R. Haffner, Assistant to Registrar, Pennsylvania State University, University Park, Pennsylvania

PURDUE UNIVERSITY

Courses: Math 515 and 516. Sequential courses in numerical analysis, utilizing the Purdue Compiler and Datatron 205.
Undergraduate Courses leading to BS
Graduate Courses leading to MS
Course Dates: School year of 1959-60
Information: L. Duane Pyle, Acting Head, Computing Laboratory, Purdue University, Lafayette, Indiana

RENSSELAER POLYTECHNIC INSTITUTE

Courses: Math T 11.88. Numerical Methods (Fall)
Math 11.87. Computer Programming (Spring)
Math T 11.90. Numerical Methods for Engineers (Spring)
Math G 11.89. Numerical Analysis (Spring)
CE T5. Application of Digital Computer Techniques to Civil Engineering Problems (Spring)
EE T 7.91. Introduction to Computational Methods and Computers I (Fall)
EE T 7.92. Introduction to Computational Methods and Computers II (Spring)

Undergraduate Courses: All except G11.89

Graduate Courses: All except 11.87

Course Dates: School year 1959-60

Information: Head of the Computer Laboratory
Rensselaer Polytechnic Institute, Troy, New York

RUTGERS UNIVERSITY

Courses: 640:473, 474. Numerical Analysis and Programming for Digital Computers (1st Term)
Acct. X41. Introduction to Electronic Data Processing (1st Term)
Acct. S42. Principles of Programming Electronic Computers (2nd Term)

Undergraduate and Graduate Courses

Course Dates: School year 1959-60

Information: Registrar, Rutgers University,
77 Hamilton Street, New Brunswick, New Jersey

SACRAMENTO STATE COLLEGE

Courses: Business Administration 101. Introduction to Electronic Data Processing Systems

Undergraduate Course

Course Dates: School year 1959-60

Information: Dr. John Cox, Chairman, Division of Business Administration,
Sacramento State College, Sacramento, California

SAN JOSE STATE COLLEGE

Courses: 168. Business Data Processing
189. Special Studies (in business data processing)

Undergraduate Course in Business Management

Course Dates: School year 1959-60

Information: Prof. E. J. Laurie, Business Management Department,
Division of Business, San Jose State College, San Jose, California

STANFORD UNIVERSITY

Courses: I.E. 263. Data Processing Laboratory (All Quarters)
I.E. 261. Data Processing (Winter Quarter)
161. Introduction to Data Processing (Winter Quarter)
263. Data Processing Laboratory (All Quarters)
261. Data Processing Seminar (Winter Quarter)
367. Introduction to Electronic Data Processing (Spring Quarter)

Undergraduate and Graduate Courses

Course Dates: School year 1959-60

Information: The Registrar, Stanford University, Stanford, California

UNIVERSITY OF BUFFALO

Courses: Statistics 305. Electronic Business Data Processing (1st Semester)
Statistics 306. Integrated Electronic Business Data Processing (2nd Semester)
In addition to these, there are courses in engineering and mathematics on computer design, numerical analysis, and operations research.

Undergraduate and Graduate Courses

Course Dates: School year 1959-60

Information: Dr. Richard N. Schmidt, University ofBuffalo, Buffalo 14, N. Y.

UNIVERSITY OF CALIFORNIA, BERKELEY

Courses: Math 128 A, B. Numerical Analysis[1] (Fall)
EE 153 A, B. Digital Computer Laboratory[1] (Fall)
EE 252 A, B. Applications and Programming of Digital Computers[1] (Fall)
IE 161. Industrial Systems Analysis and Operations Research[2] (Fall)
IE 261. Advanced Topics in Industrial Systems Analysis and Operations Research[2] (Fall)

Undergraduate Courses: Math 128 A, B; EE 151, A, B; EE 152; EE153A, B; IE 161; leading to BS degree

Graduate Courses: EE 251 A, B; EE 252 A, B; IE 261

Course Dates: School year 1959-60

Information: 1. Prof. H. D. Huskey, 441 Cory Hall
2. Mr. R. W. Shepard, 114a T-11,
University of California, Berkeley 4, California

UNIVERSITY OF CHICAGO

Courses: 371 A and B. Operations Analysis I, II (Fall, Winter Quarters)
373A. Digital Computers and Applications (Winter)
373B. Digital Computer Techniques (Spring)
374A and B. Formal Models in Business I, II (Fall, Winter)

Graduate Courses

Course Dates: School year 1959-60

Information: Mr. C. M. Weil, Assistant to the Registrar
University of Chicago, Graduate School of Business,
Chicago 37, Illinois

UNIVERSITY OF CINCINNATI

Courses: Econ. 451, 452, 453; Business Problems and Data Processing. Course includes laboratory sessions using an IBM 650 for problem solutions.

Undergraduate Course leading to BBusAd

Course Dates: School year 1959-60 (4 terms)

Information: Dr. John W. Ashley, Department of Economics,
College of Business Administration,
University of Cincinnati, Cincinnati 21, Ohio

UNIVERSITY OF DAYTON

Courses: Bus. 340. Introduction to Data Processing (1st Semester)
Bus. 341. Principles of Systems and Procedures (2nd Semester)
Undergraduate Courses
Course Dates: School year 1959-60
Information: Professor Fr. G. McGovern, University of Dayton, Dayton 9, Ohio

UNIVERSITY OF DETROIT

Courses: Math 134. Numerical Analysis
Accounting 145. Introduction to Electronic Data Processing
BA 274. Managerial Applications of the Electronic Computer
BA 275. The Feasibility Study
Institute for Business Services Courses in EDP (Extension course)
Undergraduate Course: Acc 145
Graduate Courses: Math 134, BA 274, BA 275
Course Dates: School year 1959-60
Information: Dr. Gerald Markle, Mathematics Department
Dr. Cecil Birch, Institute for Business Services,
University of Detroit, 4001 W. McNichols, Detroit 21, Michigan

UNIVERSITY OF ILLINOIS

Courses: Math E.E. 294. Introduction to the Theory of Digital Machines (1st and 2nd Semesters)
Math 295. Introduction to the Use of Digital Computer (1st and 2nd Semesters)
Math 395. Advanced Programming (1st and 2nd Semesters)
Math-Agron. 365. Digital Computer Methods for Statistical Data Processing (1st Semester)
Bus. Adm. 373. Electronic Data Processing for Business (2nd Semester)
Plus other courses in computer design, mathematics, and scientific computer programming.
Undergraduate Courses: All
Graduate Courses: 395, 365, 373
Course Dates: School year 1959-60
Information: Dr. Walter C. Jacob, Res. Prof. of Data Processing,
208 b Davenport Hall, University of Illinois, Urbana, Illinois

UNIVERSITY OF MICHIGAN

Courses: BA 125. Electronic Data Processing Systems (1st Semester)
IE 160. Operations Research
IE 164. Data Processing
IE 250. Operations Research Seminar (1st Semester)
IE 251. Operations Research Seminar (2nd Semester)
Many other courses in mathematics and electronic design are offered.
Undergraduate Courses: 125, 160, 165
Graduate Courses: 250, 251
Course Dates: School year 1959-60
Information: Office of Registration and Records
University of Michigan, Ann Arbor, Michigan

UNIVERSITY OF SOUTHERN CALIFORNIA

Courses: Accounting 565. Accounting Machine Systems (Electronic)[1]
BA 527. Introduction to Electronic Business Systems[2]
BA 528. Basic Data Processing Machine Operation[2]
IE 464L. Systems Engineering (Spring Only)[3]
Math 456. Mathematics of High-Speed Computers[4]
Math 457L. Mathematics of High-Speed Computers Laboratory[4]

Undergraduate Courses: IE 464L, Math 456 and 457L, leading to BS

Graduate Courses: Acc 565, BA 527, BA 528, leading to MBA

Course Dates: School year 1959-60

Information:
1. Accounting Department, School of Commerce
2. Business Administration Department, School of Commerce
3. Department of Industrial Engineering, School of Engineering
4. Department of Mathematics, College of Letters, Arts, Science, University of Southern California, Los Angeles 7, Calif.

UNIVERSITY OF TENNESSEE

Courses: Gen Bus 433. Electronic Data Processing (Winter Quarter)
Off Adm 455d. Problems in Data Processing (Spring Quarter)

Undergraduate and Graduate Courses

Course Dates: School year 1959-60

Information: Prof. G. A. Wagoner, Head, Business Education and Office Administration, University of Tennessee, Knoxville, Tennessee

UNIVERSITY OF TEXAS

Courses: Math 355. High-Speed Computer Programming

Undergraduate Courses

Course Dates: Fall 1959-60

Information: Mr. David M. Young, Director, Computation Center
The University of Texas, Austin, Texas

UNIVERSITY OF TORONTO

Courses: Physics 18. The Logical Basis of Digital Computing Machines
Physics 21. Numerical Methods
Physics 25. Programming for Digital Computers

Graduate Courses leading to MA and Ph. D. in Physics and Mathematics

Extension Courses: High Speed Data Processing
Engineering Techniques for Digital Computers

Course Dates: School year 1959-60

Information: Dr. C. C. Gotlieb, Department of Physics,
University of Toronto, Toronto, Ontario, Canada

UNIVERSITY OF UTAH

Courses: EE 175. Computer Programming (Fall, Winter and Spring)

Undergraduate Course

Course Dates: School year 1959-60

Information: Dr. Robert E. Stephenson
University of Utah, Salt Lake City, Utah

UNIVERSITY OF WASHINGTON

Courses: Acc 344. Introduction Electronic Data Processing (Winter Quarter)
Acc 444. Advanced Electronic Data Processing (Spring Quarter)

Undergraduate Courses

Course Dates: School year 1959-60

Information: Dr. Kermit O. Hanson, University of Washington
Accounting, Finance & Statistics Department,
College of Business Administration, Seattle, Washington

WESTERN RESERVE UNIVERSITY, SCHOOL OF LIBRARY SCIENCE

Courses: 572. Machine Literature Searching
574. Language Engineering
582. Special Studies in Documentation

Graduate Courses leading to MS in Library Science

Course Dates: School year 1959-60

Information: Dean Jesse H. Shera, School of Library Science,
Western Reserve University, Cleveland 6, Ohio

Training

Two-week course for practicing engineers in scientific and engineering computation

Date: July 6-17, 1959

Place: Case Institute of Technology, Cleveland, Ohio

Fee: $375

Information: Dr. James R. Hooper, Jr., Director of Special Programs,
Case Institute of Technology, Cleveland 6, Ohio

Summer Course in Crystallographic Computing on the IBM 650

Date: July 13-17, 1959

Place: University of Pittsburgh

Content: Theory and practice of crystal structure analysis and electron density calculations. Familiarity with the IBM 650 is helpful but not essential.

Fee: $100. Registration is limited to 30 participants.

Information: William B. Kehl, Director, Computation & Data Processing Center, 825 Cathedral of Learning, The University of Pittsburgh, Pittsburgh 13, Pa.

Introduction to Programing, Seminar

Date: July 20-31, 1959

Place: George Washington University

Information: School of Engineering, George Washington University,
Washington, D. C.

"Electronic Data Processing for Business and Industry" (Course 10) presented by Richard G. Canning

Date: July 27-31, 1959
Place: New York (Barbizon Plaza Hotel)
Fee: $250
Program: Emphasis on the applications aspect of electronic data processing. Four guest lecturers on specific applications.
For whom: Management personnel charged with setting up an EDP system
Information: Richard G. Canning, 1140 South Robertson Blvd., Los Angeles 35, California

1959 Statistical Methods in Industry Course

Place: University of California at Los Angeles
Program: Basic Course in Statistical Quality Control, August 3-14
The Advanced Course in Industrial Statistical Techniques, August 3-14
The Industrial Reliability Course, July 27 - August 14
Information: Professor Edward P. Coleman, Department of Engineering, University of California, Los Angeles 24, California

"Frontier Research in Digital Computers," two-week summer conference

Date: August 17-28, 1959
Place: University of North Carolina, Chapel Hill, N, C.
Courses: Introductory course, "Modern Uses of Digital Computers," for beginners in the field
Advanced courses: "Advanced Numerical Analysis"
"Automatic Programming and Artificial Intelligence"
Fees: Introductory course, $150; Advanced courses, $200
Visiting lecturers include professors from France, Germany, Russia, Switzerland and the United States
Information: The Director, Research Computation Center, University of North Carolina, Chapel Hill, N. C.

AMA Systems Courses

Unit I: September 14-18, 1959
Sheraton Palace Hotel, San Francisco
Unit II: October 26-30, 1959
Ambassador Hotel, Los Angeles
Unit III: November 30 - December 4, 1959
Ambassador Hotel, Los Angeles
Information: Andrews M. Lang, American Management Association Academy, Saranac Lake, New York

Meetings

Sixth Annual Symposium on Computers and Data Processing, sponsored by Denver Research Institute

Date: July 30, 31, 1959
Place: Estes Park, Colorado (Stanley Hotel)
Program: Four half-day sessions devoted to each of following: Components, Logical Design, Computer Design, Systems Organization
Information: Denver Research Institute
University of Denver, Denver 10, Colorado

Bendix G-15 Users Exchange Organization

Date: September 16-18
Place: Palo Alto, California

ISA Conference

Date: September 21-25, 1959
Place: Chicago, Illinois
Information: Instrument Society of America, 313 Sixth Avenue
Pittsburgh 22, Pennsylvania

1959 International Systems Meeting, Systems and Procedures Association of America

Date: October 12-14, 1959
Place: Toronto, Ontario (Royal York Hotel)

International Automation Exposition-Congress

Date: November 16-20, 1959
Place: New York (Trade Show Bldg.)
Information: Richard Rimbach, 845 Ridge Ave., Pittsburgh 12, Pa.

Eastern Joint Computer Conference

Date: December 1-3, 1959
Place: Boston, Mass. (Statler Hilton Hotel)
Papers: Abstracts of papers to be submitted for acceptance should be sent before August 15 to J. H. Felker, Bell Telephone Labs, Mountain Avenue, Murray Hill, New Jersey